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The results of the study indicated that the majority of the respondents recognize the value of this form of electronic mail. The "users" of electronic mail perceived that they were seeking the opinions and feedback from remote experts, distributing information, and coordinating actions more effectively. However, the study also concludes that the potential benefit and impact of this technology on the information worker at HSC has not been (Cont)			
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fully realized. Lack of training and standard procedures for this technology were demonstrated as major problems in the productive use of electronic mail. The study recommended that the computer based message system form of electronic mail merits continued support, investment, and proliferation throughout the headquarters; and that training and standard procedures be introduced to ensure its productive use.

A STUDY TO ANALYZE
ELECTRONIC MAIL AS A
DECISION MAKING TOOL
AT HEADQUARTERS,
UNITED STATES ARMY
HEALTH SERVICES COMMAND

A Graduate Research Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Health Administration
by
Major Ray G. Brueland
June 1988

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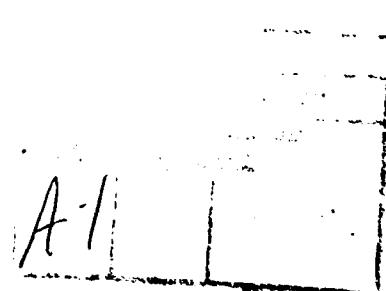


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CHAPTER 1
INTRODUCTION

Conditions Which Prompted the Study

In a fast moving and rapidly changing, highly competitive environment, decisions with varying degrees of risk must be made rapidly. "Anything that can be done to reduce risk in managerial decision making will reduce the cost (actual or potential) of any particular decision" (Sheldon, 1986, 186). Managers are finding themselves overwhelmed by hundreds of new innovations designed to streamline the management process.

Innovation, transition, and change have become the watchwords in our society. In his work, Megatrends, John Naisbitt reports that the information society is an economic reality and that innovations in communications and computer technology will accelerate the pace of change by collapsing the information float (1982, 19). The explosion of technology, communication capabilities, and available data, forces managers and leaders at all levels of a health care organization to use innovative methods and different approaches in their problem solving and decision making.

In a health care organization, decision making requires the integration of administrative, financial, and clinical data (Mager, 1987, 74). In an era of technological change and

mounting competition, few organizations can afford decisions based upon intuition, reaction, or experiences. As time pressures intensify, as situations become more complex, as penalties for being wrong increase, a manager needs the confidence that his or her decisions are as good as possible before action is taken (Kepner and Tregoe, 1973, 39). "The manager cannot do much to control the random, the stochastic, the stray consequence of outrageous fortune. What the manager can do is be informed" (Waterman, 1987, 60).

The use of computer based message systems as a competitive tool has been touted as one of the most exciting concepts in business communications. Electronic mail has the potential to improve not only the communications within a corporation, but also the company's managerial efficiency and profitability.

In 1987, North America's public electronic mail services carried 18,850,000 messages a month. Walter E. Ulrich, a founding director of the Electronic Mail Association, believes that the electronic mail market will double every year and will become a nine billion message market by the end of the decade. He predicts that "electronic mail will reach 23 billion pieces in 1990 and 85 billion pieces in the year 2000." (Mortensen, 1987, 26).

The task of excelling in business will be an even greater challenge as this technology age matures. If a firm is to be competitive in the 1990s, it will have to speed up the transfer of information within the company. The potential for the use of computer based message systems in the business world is very

high. The competitive edge will go to corporations who realize this potential and make the necessary moves to integrate these services into their normal work place philosophy. What is needed is desk to desk rather than division to division communications. Many corporations believe that electronic mail should be a part of every work station environment. Organizations must convince their managers "that the technology will indeed fit into their work environment as a logical extension of daily duties and work patterns" (Mortensen, 1987, 27).

Many managers have not realized the effect that electronic mail services may have in boosting their company's overall success. Electronic mail can improve communication patterns, personal productivity, quality of work life, and even working relations. In short, electronic mail, strategically implemented, can be a key competitive tool (Loveland, 1986, 32).

These environmental factors force the following issues to be addressed: What is the United States Army Health Services Command's (HSC) guidance related to the use of this technology? Is this technology being properly used? Should scarce resources be allocated to this technology? Does HSC have a requirement to invest in this technology?

Problem Statement

The purpose of this study is to analyze and evaluate attitudes toward the use of electronic mail as a component of

office automation at Headquarters, United States Army Health Services Command. There are many forms of electronic mail. The focus of this research is on computer based message systems. The computer based message system form of electronic mail provides the capability of flexible, electronic transfer of information at the work site of the manager. This study analyzes the use and impact of computer based message systems.

Objectives

The terminal objective of this research is to determine the value of using electronic mail at Headquarters, HSC. To accomplish the terminal objective, three supporting objectives were accomplished: First, it was necessary to interpret the current literature concerning the value of electronic mail in decision making. Second, an analysis of individual user accounts to determine the actual usage patterns of the Dialcom service at Headquarters, HSC, was accomplished. The Dialcom service is a public computer based message system. This investigation of accounts provided a measure of the usage patterns of electronic mail within the headquarters. And third, it was necessary to interpret and analyze the data gathered by the survey instrument. The survey instrument was designed to determine the perceived value of electronic mail and its impact on individual problem solving and decision making.

By accomplishing the three supporting objectives this research attempts to broaden the understanding of electronic mail. As a component of office automation, electronic mail has the potential to improve decision making and problem solving by improving communications. The study concludes with recommendations concerning potential proliferation of electronic mail as a component of office automation at Headquarters, HSC.

Criteria

The research survey was divided into two groups, "users" with an n of 61, and "non-users" with an n of 64. The perceived business value or impact on problem solving and decision making between the "users" and "non-users" of electronic mail was considered statistically significant if a P-value less than 0.05 for the difference between the sample means was found.

Assumptions

The senior leadership at Headquarters, HSC was not convinced of the business value of electronic mail. It was necessary to assume that Dialcom or some equivalent form of computer based message system would survive the budgetary process. The necessity of this assumption validates the need for this research and increases its value.

Limitations

The survey instrument measures the perceptions of the defined groups during the January 1988 to March 1988 period. While this is a valid representation of the opinions of HSC personnel, it is anticipated that these perceptions will change as office automation becomes more sophisticated throughout the headquarters.

To have an opinion on the impact or use of electronic mail a person must have some understanding of the technology. As a minimum, the term "electronic mail" must be part of the respondent's vocabulary. The respondent, also must have a concept of the use of electronic mail. The initial selection of members for the sample was developed from employees who were known to use electronic mail. The "non-user" group was also required to have familiarity with the technology. This sampling limitation does not invalidate the applicability of the research to other organizations.

Review of Literature

Electronic mail is a form of office automation which transmits data or information, usually in a textual format, by electronic means from one work area to another work area. It is the popular term for many new forms of communication which take

advantage of computer and telecommunication technology. The Electronic Mail Association defines electronic mail as: "a generic term for the non-interactive communication of text, data, images or voice messages between a sender and designated recipient by systems utilizing telecommunication links" (Mortensen, 1987, 26).

Electronic mail is commonly used as a generic term that encompasses many forms of transmitting textual information. These forms include: facsimile; telegram, mailgram, Telex, and TWX; communicating word processing systems; voice mail systems; and computer based message systems. Electronic mail systems may be established with computers or without computers. Most forms of electronic mail have the capability of synchronous communications, although normally communications are nonsynchronous. Systems may output hard copy although soft copy is preferred. Each form of electronic mail has its own set of advantages and disadvantages.

Facsimile, or fax, is a proven and effective form of electronic mail for sending information in the form of an image replica. Facsimile may be considered a type of long-distance photocopying. A hard copy sent from one location is duplicated at a different location. Two factors contribute to the popularity of facsimile units. One is the ease of use and the other is the need for copying signatures or handwritten material. Facsimile "is by far the most flexible and inexpensive form of electronic mail, and it is easy to implement" (Mortensen, 1987, 27). Facsimile's major limitation is that messages are generally

received in the form of a paper image and cannot be edited or changed without typing the information.

Telegrams and mailgrams are a form of electronic mail with which the office worker does not directly input or receive the output. Messages are prepared and then forwarded by some means to the servicing office for transmission. This was the first form of electronic mail to be developed.

Teleprinter Exchange Service (TELEX) and Teletypewriter Exchange Service (TWX) are based on direct connection operation, thus the message exchange takes place directly from terminal to terminal. TELEX/TWX have the advantage of being established and having widespread acceptance. It is estimated that there are more than 150,000 TWX and TELEX teletypewriters worldwide.

Communicating word processing is an advanced word processing application. It is particularly useful in exchanging lengthy documents from one location to another. To communicate, the two word processing systems must have compatible modems and be operating with the same communications protocol. Normally, the operators of the two systems must communicate to synchronize and verify transmissions. Software and hardware non-compatibility prevents easy communication between word processing systems of different manufacturers.

Voice mail is a form of electronic mail that is still in its infancy and not widely used. This form of electronic mail uses a combination of standard telephone equipment, computers, terminals, modems, and telecommunication networks. Voice mail is offered in two basic versions. In one version the user accesses

his message either through a terminal or a regular telephone. The mail service computer, at the user's option, can turn the electronic signals into speech to enable the user to listen to the message over a regular telephone. The second version digitizes the spoken message from the user and stores it in the computer.

As stated earlier, this research focused on the computer based message system (CBMS) form of electronic mail. This technology brings flexible, electronic transfer of information to the desks of leaders, subject matter experts, and support staff. CBMS provides the capability for the end user to transmit textual type material at lower costs and higher speeds than are possible with traditional methods of business communications (U.S. Army, 1988, 5). "Today the average electronic mail message has dropped to 86 cents per message and can be as low as five to seven cents per message on some in-house systems" (Mortensen, 1987, 31).

Some of the services offered through computer based message systems include, an electronic news wire clipping service, executive calendar and scheduling, on-line news wire access service, and electronic publishing. CBMS may provide faster delivery of information, reduce paperwork volume for the office, eliminate unnecessary interruptions, and improve access to remote personnel. Computer based message systems may be linked computer to computer, store and forward, "mail boxes," terminal to computer, intra-area networks, gateways, and value added networks.

The CBMS form of electronic mail operates conceptually in the same way the postal system does. The CBMS acts as a distributor of electronic messages which can be as long or as short as the user desires. Each CBMS subscriber is assigned an electronic "mailbox" account that can receive messages at any time (Kutik, 1986, 58). Access to the CBMS electronic mail service is obtained by telephone, usually through a modem, into a host computer network. If the user is within local dialing distance of a major city, he or she may dial into a network without incurring long distance charges. Once logged into the system, the user's personal computer becomes, in effect, a remote terminal for the large mainframe running the service. The user is afforded the capability to read messages on line or to store messages on a local storage device for later retrieval. Messages may be sent just as easily to an individual or to hundreds of terminals specified on a previously user-created distribution list.

Private electronic mail services are operated by privately owned software packages which run on the organization's mainframe or microcomputer. A private, in-house operation, requires substantial initial investment and manpower. Private electronic mail services appear to offer more flexibility and may be designed for specific uses.

Ten examples of public service systems are given in Table 1 to demonstrate the availability of the sources and the networks which connect the users to the services. The standard telephone service or direct distance dialing, provides the basic

Table 1**Ten Public Electronic Mail Services**

Service	Company	Network
Telemail	GTE Telenet, Inc.	Telenet
Easylink	Western Union Telegraph Co.	Connect #
Dialcom	Dialcom, Inc.	Uninet, Tymnet, Telenet, Datapac
Infoplex	Compuserve, Inc.	Compuserve, Tymnet, Telenet, Datapac
On Tyme	McDonnell Douglas	Tymnet
MCI Mail	MCI Communications Corp.	Connect #, Tymnet
The Source	Source Telecomputing Corp.	Uninet, Telenet
Delphi	General Videotex Corp.	Uninet, Tymnet, Datapac
RCA Mail	RCA Global Communications	Telenet
Dialmail	Knowledge Index	Tymnet, Dialnet, Uninet, Telenet

Source: Davis, The Electronic Mail Box, 1986.

telecommunications framework for most of the public computer based message system services available.

A primary benefit of using a computer based message system is the reduction in the creation of paper documents. The computer system will also keep track of documents. Another potential

advantage of electronic mail is that all messages can be received at one time. Messages can be grouped together and handled during a single period of the day. Messages may be organized off line with the user's own word processor and depending on the urgency of the message, be sent at any time night or day. "Opinions and feedback from remote experts and people that might be affected by a decision are easier to obtain, thus improving the decision's quality and the probability of its group acceptance"

(Reynolds, 1984, 193).

An advantage of CBMS is that it is nonsynchronous. There is no reason to search for the recipient of a message, a practice which is common place with the conventional telephone. It also can eliminate or greatly reduce interruptions of the information worker. Messages may be sent without wasting time waiting to establish contact with the recipient. Messages are received instantly without enduring a several day delay through the postal system. Messages can be distributed to multiple recipients electronically in order to disseminate the information broadly. Table 2 highlights many of the potential benefits that may be gained by the use of computer based message systems.

There are drawbacks to electronic mail. Security is a problem even though users have passwords to protect access to their accounts. The privacy of electronic mail does not have the same protection by law as regular U.S. Mail. If the recipient does not access the system, he or she may not be aware that a message is waiting to be received. Phone line noise and

Table 2

Advantages of Using Computer Based Message System

Improved coordination of activities (Access to remote experts)

Rapid transmission of messages to individuals or groups

Rapid, electronic forwarding of messages

Shortened messages and reading time

Automatic record of messages

Nonsynchronous communications

Around-the-clock messages (Time-zone transparency)

Geographic transparency

Reduction of paperwork and paper handling costs

Reduction in volume of photocopying

Reduction in postage cost

Reduction in office space and labor used in paper file storage

Efficient automated file searching and retrieval

Elimination of misplaced or lost documents

Delivery impervious to weather conditions and holidays

Powerful manipulative options available with electronic media

Improved time management

Elimination of no-contact telephone calls (telephone tag)

Reduction of interruptions

Source: Barcomb, Office Automation: A Survey of Tools and Techniques 1981.

technical problems may result in stray characters in the message being received. Table 3 highlights many of the potential disadvantages encountered in using computer based message systems. Formatting problems, improper use of networks, and message handling are possible shortcomings of a CBMS which indicate inadequate training.

Table 3

Disadvantages Encountered in Using Computer Based Message Systems

Incompatible equipment

Lack of gateways to other networks

Anxiety of using something new and unfamiliar

Lack of directories of users between networks

Message and information security

Nonsynchronous communications

Lack of training

Source: Loveland, Richard A. "E-Mail: An Effective Competitive Tool." Information Week. (July 7, 1986): 32 and Kutik, William M. "Instant Access." Telecommunications. (May 1986): 57-63.

There are generally four reasons why companies may not be fully successful at managing their electronic mail environment. First, information workers may not fully understand the possible uses of electronic mail; therefore, they only realize a fraction of its potential. Second, the users are inadequately trained.

Third, equipment and services are often purchased without a clear understanding of the needs. And fourth, investments are made without clear reasonable expectations of recovering costs on productivity gains (Green, 1988, 80).

Headquarters, United States Army Health Services Command

The United States Army Health Services Command (HSC) is the Major Army command responsible to provide health services to support the mission of the Army. The command has the mission to plan and be prepared to implement all mobilization and contingency health services support requirements. The command provides health services for the Army in the continental United States, Panama, Puerto Rico, Alaska, Hawaii, Johnston Atoll, and Guam. The command also provides medical, veterinary, and dental professional education and training for Army Medical Department personnel (U.S. Army, 1988, 2).

The purpose of Headquarters, HSC, is to provide decisive leadership, command, control, and management support to all elements of the command and to interact with the external entities which impact the mission. Headquarters, HSC, is organized into eight directorates, four field operating activities, and numerous special staff offices. Figure 1 in Appendix A is the organizational chart for Headquarters, United States Army Health Services Command.

Each directorate, special staff office, and field operating activity at HSC has been allowed to use its own initiative in the implementation of futuristic modes of office automation to increase its ability to gather information and make decisions. Copiers, electronic typewriters, and word processors are common place. Within Health Services Command various means of data communication techniques have been developed which provide the opportunity to move large amounts of data and information faster and more accurately to the appropriate decision maker. All forms of electronic mail are used within the headquarters with widely differing usage patterns among the various users.

Office Automation and Electronic Communication

Office automation is the application of electronic and electro-mechanical devices to administrative procedures for the purpose of increasing the efficiency and the effectiveness of the office. Office automation encompasses many applications including word processing, the telephone, copiers, electronic mail, networking, video integrated systems, and many other office applications. Office Automation is the use of technology to improve the efficiency of office functions. Its basic functional elements are: document preparation and reproduction; communication; and information storage and retrieval through a variety of media. "Office automation requires that secretaries,

clerks, supervisors, managers, and even executives use computer equipment" (Walsh, 1985, 263).

The modern office is an unnatural place to work. It is confining. In the automated office it is no longer necessary to meet co-workers or customers in a central location to disseminate information. The information worker is concerned with creating, editing, and managing information. Electronic mail should improve the communication skills, decision making, and problem solving of the information worker.

Electronic communications consists of telecommunications and data communications. "Telecommunications is the use of telephone, teletypewriting, telegraph, radio, or television facilities to transmit information" (Barcomb, 1981, 31). Held and Ray have defined data communications as the movement of data and information from one point to another by means of electrical or optical transmissions systems (1983, 32). Office automation allows the integration of telecommunications and data communications for the end user at his or her work station. The implications of electronic communication include a dramatic increase in the number of connections possible among both individuals and organizations. This increasing number of potential connections or interactions creates a completely new environment for the sharing and dissemination of information (Trudell, Bruman, Oliver, 1984, 147).

Decision Making

"Decision making is both an art and a science" (U.S. Army, 1984, 5-1). Managers and leaders must not only decide what to do but also recognize when a decision is necessary. Organizational and individual decision making are affected by the environment, technology, and amount of time available to make the decision.

Sound decisions result from a thorough, clear, unemotional analysis of all the facts and assumptions relating to a situation. "A systematic approach to problem solving assists the leader in applying thoroughness, clarity, judgement, logic, and professional knowledge to the task" (U.S. Army, 1984, 5-1).

Recognizing and defining the problem, gathering facts and making valid assumptions, developing possible solutions, analyzing and comparing solutions, and testing the alternatives can all be improved by having better, faster, and more accurate forms of communication.

All three categories of information workers may benefit from the use of electronic mail in their decision making. The supporting staff, the subject matter expert, and the leader of the office require better, faster, and more accurate information upon which to base their decisions.

Methodology

The data for this research was collected through a field study using Dialcom billing reports and a research survey. A review of the literature, consultation with key personnel at the U.S. Army Academy of Health Sciences and Headquarters, U.S. Army Health Services Command, and feedback from the respondents who took the pilot survey contributed to the development of the survey. The Dialcom bills provided a measure of usage patterns while the survey provided an understanding of the perception of the value received from the use of electronic mail.

Headquarters, HSC, through its field operating activity, Health Care Systems Support Activity, purchases access to a computer based message system service from Dialcom, Incorporated. A sample of 101 accounts from the Dialcom service was taken to analyze the actual use of the electronic mail service. It is recognized that there are other electronic mail services available to headquarters personnel. OPTIMIS and COA Host are two other CBMSSs available for use. The Dialcom service was analyzed due to its being the electronic mail service which is funded by HSC. The users options available from this service are contracted and controlled directly by HSC. Analysis of the billing reports insured that all heavy users of the Dialcom electronic mail service at headquarters were included in the sample used for the research survey.

Bills from the Dialcom service were initially used to select possible members of the "users" group. The "non-users" group was then developed from the response to question 8 on the survey instrument. The survey instrument measured the perceptions of the sample on the value of electronic mail within the headquarters. A pretest of the survey was accomplished from an external sample at the Academy of Health Sciences. The survey instrument was modeled from a survey published by Geoffry S. Howard on computer anxiety. Each member of the sample was personally contacted and asked to complete the survey instrument. The "users" group consisted of Headquarters, HSC personnel who responded to survey question number 8 affirmatively, indicating that they used electronic mail at work. The "non-users" group responded negatively, indicating that they did not use electronic mail at work.

The data was analyzed by the employment category, age, gender, duty category, supervisory position, and tenure of the respondents as well as their use of electronic mail. The business value or impact of electronic mail on individual decision making and problem solving was established by measuring the:

- (a) Perceived increased in the speed of coordination (time compression) for problem solving.
- (b) Perceived reduction in travel and associated problems with geographical separation by the use of electronic mail.

(c) Perceived improvement in accessing information across organizational boundaries which is facilitated by direct "one-way" communication linkages.

(d) Perceived cost savings due to efficiencies created by the use of electronic mail.

(e) Perceived increase in the number of sources contacted in problem solving.

(f) Perceived change in the status of organizational roles performed by the users of electronic mail.

(g) Perceived reduction of anxiety in using electronic mail as a component of office automation.

CHAPTER 2
DISCUSSION

Analysis of Survey Instrument

The survey instrument which was developed consisted of five subsections and is provided in Appendix B. Section one provided the participants demographic data: employment category, gender, age, duty category, supervision level, and tenure. The respondents use and access to electronic mail was ascertained by questions 8 and 9. Section two contained four statements and one question which pertained specifically to use of personal computers. Section three contained twenty-one statements and one question which pertained to communicating by electronic mail and its impact on decision making. The fourth section contained six questions and pertained to the respondents knowledge about personal computers and electronic mail. The fifth section contained four questions which analyzed the respondents usage rates and patterns on personal computers and electronic mail.

Eighty surveys were individually handed out to develop the "users" group. Of this first sample 77 were returned. A second sample of 50 surveys to obtain the "non-users" group was then individually handed out and 48 surveys were returned. Each respondent was personally asked to fill out the survey. Respondents were given an opportunity to ask questions before

filling out the survey. The completed surveys were picked up later the same day. The high response rate, 96.15 percent, is attributed to a high interest in the subject from both "users" and "non-users", the personal nature in which the survey was conducted and the quick follow up seeking the completed survey instrument.

Appendix C shows the demographics of the respondents to the research survey. Fifty-six percent of the sample were males, 34.4 percent were supervisors, and 48.8 percent were "users" of electronic mail. Thirty-eight officers, 15 enlisted personnel, and 72 civilian employees were surveyed.

The Value of Personal Computers

Survey statements 10 through 13 were summed to derive a single composite attitude score for the perception of the respondent as to the value of using a personal computer. The responses to the individual statements were coded on a likert scale from 1 to 5; with 1 representing the strongly disagree response, 2 representing the disagree response, 3 representing the unsure response, 4 representing the agree response, and 5 representing the strongly agree response. Responses for statements 11, 12, and 13 were coded in a reverse manner; with 1 representing the strongly agree response, 2 representing the agree response, 3 representing the unsure response,

4 representing the disagree response, and 5 representing the strongly disagree response. The composite attitude score could range from 4 to 20.

The perceived value in using a personal computer was operationally defined and measured by the following statements:

(a) Statement 10: "A personal computer system would give me more timely access to needed information."

(b) Statement 11 (reverse coding): "I would not use a personal computer because this would be clerical in nature."

(c) Statement 12 (reverse coding): "Using a personal computer would involve too much time doing mechanical operations (programming, in putting data, etc.) to allow sufficient time for analysis."

(d) Statement 13 (reverse coding): "I wouldn't encourage my company to acquire personal computers because of the high purchase cost of the machine and its software."

Appendix D shows the mean response for each statement which was used to define the value of using a personal computer, the sum of the statement means and the composite means by category for the value of personal computers. Twenty-seven percent of sample did not use a personal computer. From the personnel who reported using a personal computer, 74.7 percent reported using it on a daily basis. Table 4 reports the self reported frequency of use for personal computers.

Table 4**Self Reported Frequency of Use for Personal Computers**

How Often It is Used	Total (125)	Users (91)
Not At All	27.2%	0.0%
Occasionally During Year	7.2%	9.9%
At Least Once A Month	1.6%	2.2%
At Least Once A Week	9.6%	13.2%
At Least Once A Day	54.4%	74.7%

Source: Research Survey.

Respondents were asked to list the biggest obstacles in using a personal computer in their work area. There were 123 responses to this question from 92 respondents which were categorized into 13 obstacles. Table 5 reports the frequency of the perceived obstacles in using a personal computer in the work place.

Table 5**Obstacles to the Productive Use of Personal Computers**

Lack of Proper Training or Time for Assimilation of Various Applications	43
Lack of Personal Computers or User Peripheral Equipment	14
Reluctance to Learn, Anxiety About Learning the Unfamiliar Technology	12
Lack of Space	11
Lack of Proper Software	8
Inadequate Maintenance	8
Lack of Standard or Compatible Software	5
Lack of Standard or Compatible Equipment	5
Lack of Proper Networks	5
Too Many Interruptions	4
Lack of Standard Procedures	4
Cost of Systems	3
Lack of Personnel	1

Source: Research Survey.

The Value of Electronic Mail

Survey statements 15 through 35 were grouped into seven groups of three statements each. Each group of statements defined a concept to demonstrate the business value for a

computer base message system. Table 6 identifies the statements which were analyzed for each business value.

Table 6

Survey Questions Used to Define Business Values

Survey Questions	Business Values
20, 30, 31	Increased Speed of Coordination
23, 28, 34	Reduction in Travel
19, 24, 27	Increased Access to Information
21, 25, 29	Cost Savings
15, 17, 26	Increased Number of Sources Contacted
16, 22, 35	Change in Organizational Roles
18, 32, 33	Reduction in Anxiety

Source: Research Survey.

The responses to the individual questions were summed to derive a composite attitude score for each business value. The responses to the individual statements were coded on a likert scale from 1 to 5; with 1 representing the strongly disagree response, 2 representing the disagree response, 3 representing the unsure response, 4 representing the agree response, and 5 representing the strongly agree response. Responses for statements 16, 18, 20, 22, 24, 27, 29, 32, and 33 were coded in a reverse manner; with 1 representing the strongly agree response, 2 representing the agree response, 3 representing the unsure

response, 4 representing the disagree response, and 5 representing the strongly disagree response. The composite attitude score could range from 3 to 15.

The perceived increase in the speed of coordination by using electronic mail was operationally defined and measured by the following statements:

(a) Statement 20 (reverse coding): "Outside activities will not answer coordination efforts in a timely manner using electronic mail."

(b) Statement 30: "Electronic mail reduces the time necessary for me to collect and evaluate alternatives in my problem solving."

(c) Statement 31: "Using electronic mail, I am able to coordinate with outside activities in a more timely fashion."

The perceived reduction in travel and the associated problems with geographical separation by the use of electronic mail was operationally defined and measured by the following statements:

(a) Statement 23: "One benefit of using electronic mail has been the reduction in travel requirements for my office personnel."

(b) Statement 28: "Sending a message by electronic mail requires the same amount of effort regardless of where the recipients are physically located."

(c) Statement 34: "Electronic mail decreases problems often associated with being geographically separated."

The perceived increase in the access to information created by the use of electronic mail was operationally defined and measured by the following statements:

(a) Statement 19: "Using electronic mail, I have the capability of providing information directly to organizational elements several levels above and/or below my normal chain of command.

(b) Statement 24 (reverse coding): "A problem with using electronic mail at work is the lack of control in disseminating information.

(c) Statement 27 (reverse coding): The free flow of information created by electronic mail undermines the authority of the chain of command.

The perceived cost efficiencies and savings realized by the use of electronic mail was operationally defined and measured by the following statements:

(a) Statement 21: "The cost of electronic mail is justified by the efficiencies in information handling it creates."

(b) Statement 25: "Using electronic mail will reduce the total cost of doing business."

(c) Statement 29 (reverse coding): "Electronic mail is primarily just a toy so it is not of much value in my problem solving."

The perceived increase in the number of sources contacted when using electronic mail was operationally defined and measured by the following statements:

- (a) Statement 15: "Electronic mail provides me better access to multiple sources of information."
- (b) Statement 17: "Using electronic mail, I can gather more information upon which to base my decisions."
- (c) Statement 26: "Electronic mail increases the number of resources I can contact to develop alternatives in my problem solving."

The perceived change in organizational roles created by the use of electronic mail were operationally defined and measured by the following statements:

- (a) Statement 16 (reverse coding): I would not want desk top access to electronic mail because I would not be able to delegate the routine data look-up tasks which I now delegate."
- (b) Statement 22 (reverse coding): "If I personally used electronic mail at work, it would damage the managerial image which I want to project."
- (c) Statement 35: "Having direct access to all levels of management through electronic mail has changed who I contact in my problem solving."

The perceived reduction in anxiety in using electronic mail from being a "user" was defined and measured by the following statements.

- (a) Statement 18 (reverse coding): "I will not use electronic mail because it takes too much time to learn to use."
- (b) Statement 32 (reverse coding): "I would not personally use electronic mail because in putting data takes too much time."

(c) Statement 33 (reverse coding): "I hesitate to use electronic mail at work because of the difficulty in using the prescribed system."

Appendix E shows the mean response for each statement which was used to define the various business values of electronic mail, the sum of the statement means, and the composite means by category for each business value. Appendix F reports one for one correlations for thirteen variables of interest. These correlations reveal that "use" was positively correlated to all seven business values. The correlation between business values and "use" was significant at the 0.05 level in all cases except the reduction in travel. Clerical duty respondents were negatively correlated to "use" and were the only duty category which was significant at the 0.05 level.

Clerical duty respondents correlated negatively to all business values except the reduction in travel. This demonstrated that the clerical duty respondents were not convinced of the business value of electronic mail (except for the reduction in travel).

Office leader and supervisor respondents correlated positively to all business values except the reduction in travel. This demonstrated that the office leaders and supervisor respondents were convinced of the value of electronic mail in decision making except for the reduction in travel.

Two groups were created from the sample taken. Responses to question 8 of the survey were used to place the responses of the survey instrument into the "users" or "non-users" group.

The difference between the two groups is statistically significant in six of the seven variables. Table 7 presents the differences between the sample means. The probability of

Table 7

Difference Between the Composite Means

	Codes "Users"	"Non-Users"	Differ-	Standard	T Value	P Value
			ence	Error		
1	11.4918	10.4688	1.0231	.3358	3.0466	6.4873E-05
2	10.5246	10.0000	.5246	.2980	1.7602	.0404
3	12.1639	10.8125	1.3514	.3520	3.8388	9.835E-05
4	12.0492	10.7344	1.3148	.3634	3.6180	2.159E-04
5	12.3934	11.1250	1.2684	.3706	3.4229	4.211E-04
6	11.7049	10.5938	1.1112	.3096	3.5895	2.384E-04
7	13.0164	11.1250	1.8914	.3593	5.2638	3.037E-07

Code 1 - Increased Speed of Coordination

Code 2 - Reduction in Travel

Code 3 - Increased Access to Information

Code 4 - Cost Savings

Code 5 - Increased Number of Sources Contacted

Code 6 - Change in Organizational Roles

Code 7 - Reduction in Anxiety

Source: Research Survey.

difference between two means being significant must be protected when multiple tests are conducted (Kirk, 1968, 80). The criteria of 0.05 was therefore adjusted to 0.007143. "Users" indicated agreement with all seven business values. "Non-users" were not convinced of the business value of the reduction in travel and increase in the speed of coordination which may be gained by the use of electronic mail.

The respondents were asked to list the biggest obstacles to the productive use of electronic mail in their work area. There were 100 responses to this question from 84 respondents which were categorized into 11 obstacles. Table 8 reports the frequency of the perceived obstacles in productively using electronic mail.

Table 8**Obstacles to the Productive Use of Electronic Mail**

Problems with the Telephone - lines busy, shortage of telephone lines, static on lines	23
Lack of Training	18
Lack of Equipment (Modems, Personal Computers)	14
Lack of Standard Procedures for Use of Electronic Mail	10
Reluctance to Learn, Anxiety About Learning the Unfamiliar Technology	10
Access to Electronic Mail	9
Improper Use of Electronic Mail	5
Shortage of Funds	5
Lack of Proper Network	3
Inadequate Maintenance of System	2
Too Many Interruptions	1

Source: Research Survey.

Utilization of Electronic Mail

As previously stated, a sample of 101 users of the Dialcom service was taken to evaluate the actual use of the electronic mail service. All members of the sample were assigned to Headquarters, HSC, or one of its four field operating activities located at Fort Sam Houston. The January, February, and

March 1988 customer account bills were the source of this utilization data. This 63 business day time frame was chosen to correspond with the time period in which the survey was accomplished. The monthly usage statistics are provided in Table 9. The average daily use from the accounts analyzed was just

Table 9

Monthly Average Usage in Hours of Dialcom Accounts

MONTH	MEAN	STD. DEV.	MINIMUM	MAXIMUM
JAN 88	1.3100	1.9581	.0000	10.9200
FEB 88	1.2731	1.7547	.0000	11.0100
MAR 88	1.5868	2.2516	.0000	17.0200

Source: Dialcom Bills for January, February, March, 1988.

less than four (3.972) minutes per business day for each account. The frequency distribution of the sample is displayed in Table 10. Fifty-eight percent of all accounts use the service for less than three minutes per business day. The mode of the sample use the system less than one minute per business day. The heaviest user of the Dialcom service utilized the service an average of 37 minutes per business day. There were four accounts in the sample which were not accessed during the entire three month period.

Table 10**Frequency of Use of Dialcom Accounts**

Minutes/Business Day	Number of		Cumulative	
	Users	Percent	Frequency	Percent
0 < 1	28	27.72	28	27.72
1 < 2	16	15.84	44	43.56
2 < 3	15	14.85	59	58.42
3 < 4	9	8.91	68	67.33
4 < 5	7	6.93	75	74.26
5 < 6	6	5.94	81	80.20
6 < 7	1	.99	82	81.19
7 < 8	4	3.96	86	85.15
8 < 9	3	2.97	89	88.12
9 < 10	4	3.96	93	92.08
10 < 11	1	.99	94	93.07
11 < 12	2	1.98	96	95.05
12 < 18	3	2.97	99	98.02
18 < 24	1	.99	100	99.01
36 < 42	1	.99	101	100.00
TOTAL	101	100.00		

Source: Dialcom Bills for January, February, March 1988.

The monthly average cost for an account using the Dialcom service was \$23.72 per account. Table 11 displays the average monthly cost of using the service.

Table 11**Monthly Average Cost for Dialcom Accounts**

MONTH	MEAN	MINIMUM	MAXIMUM
JAN 88	\$22.31	\$0.28	\$206.55
FEB 88	\$22.36	\$0.28	\$222.51
MAR 88	\$26.48	\$0.28	\$316.51

Source: Dialcom Bills for January, February, and March 1988.

The self reported duration of use of computers and electronic mail and frequency of use for electronic mail by respondents of the research survey are reported in table 12 and 13. The self reported use and the billing data are in general agreement. Only 34.2 percent of users of electronic mail access it on a daily basis as compared to 74.7 percent of users of personal computers reporting that they use a personal computer on a daily basis. Forty-five percent of electronic mail users reported using electronic mail for less than one year, while 44.2 percent of personal computer "users" reported using a personal computer between one and two years.

Table 12

**Self Reported Duration of Use
for Personal Computers and Electronic Mail**

How Long Has It Been Used	Computers	Electronic Mail
Do Not Use	29.6%	47.2%
Less Than One Year	18.4%	24.0%
One to Two Years	32.0%	20.8%
Three to Five Years	10.4%	6.4%
Over Five Years	9.6%	1.6%

Source: Research Survey.

Table 13

Self Reported Frequency of Use for Electronic Mail

How Often It Is Used	Total (125)	Users (57)
Not At All	45.6%	0.0%
Occasionally During the Year	12.0%	22.1%
At Least Once A Month	6.4%	11.8%
At Least Once A Week	16.8%	30.9%
At Least Once A Day	19.2%	34.2%

Source: Research Survey.

Access to Electronic Mail

Access to CBMS in the work place can be gained at the individuals work station, at a different work station, or by having another person (a secretary or fellow worker) access the system. Table 14 reports the methods employees at Headquarters, HSC, used to gain access to CBMS. Ninety percent of the "users" stated that they had access to CBMS at their work station; however, 50.82 of the same group stated they also used other people to gain access. Interestingly, 29.69 percent of "non-users" stated they have access to electronic mail, but are not using electronic mail.

Table 14**Methods to Gain Access to Electronic Mail**

Sample	n	Work Area	Another Location	Other Person
Total	125	59.20%	58.40%	53.60%
Non-Users	65	29.69%	46.87%	56.25%
Users	61	90.16%	70.49%	50.82%
Daily Users	24	87.50%	70.83%	41.67%

Source: Research Survey.

Literacy Quiz

The results of the literacy quiz are reported in Table 15. The literacy quiz tested the respondents knowledge of some basic facts concerning personal computers and using electronic mail. The results demonstrate that computer literacy, as a measure of detailed knowledge, is not necessary for the operation of a personal computer or the use of electronic mail.

Table 15

Percent Correct On Literacy Quiz

Question	Total	Non-	Users	Daily
	Sample	Users		Users
	(125)	(64)	(61)	(24)
37. Meaning of CPU	72.0%	60.9%	83.6%	87.5%
40. Recognizing Binary Storage	58.4%	39.1%	78.7%	91.7%
41. Recognizing Computer Software	88.0%	81.3%	95.1%	100.0%
38. Electronic Mail Requirements	76.8%	57.8%	96.7%	95.8%
39. Examples of Electronic Mail	84.8%	75.0%	95.1%	100.0%
42. Use of Password	76.0%	62.5%	90.2%	95.8%
Literacy Quiz Score	76.0%	62.8%	89.9%	95.1%

Source: Research Survey.

CHAPTER 3
CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The data presented in this study provides a useful insight into the use and impact which electronic mail has on decision making at Headquarters, HSC. "Users" of electronic mail are seeking the opinions and feedback of remote experts, distributing information, and coordinating actions more effectively when using electronic mail. These office leaders, subject matter experts and support staff are using a tool, which by improving the ability to communicate, improves their decision making.

The majority of the respondents recognize the value of electronic mail and consider its acquisition to be a worthwhile endeavour. This is particularly evident when the "users" composite sample means are compared to the "non-users" composite sample means. Electronic mail is being used within the command to make decisions and solve problems. However, the potential benefit and impact of electronic mail on the information worker has not been fully realized at Headquarters, HSC. Only 34 percent of the users access their Dialcom accounts on a daily basis.

The usage patterns demonstrated by the analysis of the Dialcom bills shows a large standard deviation. Regular "users" of electronic mail do not use the system in a consistent manner. Billing data indicates that 67 percent of the "users," use the Dialcom service less than four minutes a day. This is a valid indication of total use, since 65 percent of "users" indicated that they used electronic mail less frequently than once a day.

Lack of training in the use of electronic mail was pointed out as a major problem. Eighteen respondents felt that the lack of training prevented them from productively using electronic mail and desired to receive training in the proper use of electronic mail. The lack of training or time for adequate assimilation was even more apparent with personal computing. The perception is that technology is available and will accomplish the tasks, but information workers do not know how to productively use the technology. Individual training and assimilation of procedures is necessary to ensure that the expanded use of this technology does not simply automate manual inefficiencies.

Five respondents expressed concern about the improper use of electronic mail. This is of great concern to the military user. The unauthorized access to information or the uncontrolled dissemination of information might lead to breaches of security which could have disastrous consequences.

There is no written procedure or guideline for the efficient use of electronic mail. Health Care System Support Activity has produced nonspecific guidelines for the use of electronic mail.

The guidelines are generic in nature and do not address specific user applications. File storage, file naming, and formatting of messages are not and need not be standardized for the headquarters; although, providing a suggested format and method would greatly ease the apprehension of the new technology. Through the assimilation of knowledge, the "users" group demonstrated a much higher level of comfort with the use of electronic mail.

Lack of equipment was a shortcoming reported by 14 respondents. The volume of use of electronic mail is not solely limited by the availability of equipment. The lack of procedures, operating systems knowledge, and lack of desire to use this form of communication were demonstrated by the survey to be obstacles to using electronic mail. More efficient use of existing hardware, with multiple user-sharing, could solve the problem of limited availability of equipment. In addition, training and standardization could resolve many of the equipment problems.

Recommendations

It is recommended that United States Army Health Services Command continue to support, invest, and proliferate computer based message system technology in its office automation efforts. Access to electronic mail should be convenient and become a

logical extension of the daily duties and work patterns of the information worker. Its use needs to be emphasized and encouraged.

This investigation points out the need for a training program for managing the use of electronic mail. This program should be included within the office "new comers orientation" to stress and develop standardization among users. Training should be offered in short, recurring classes. The classes should not only instruct operators on how to use electronic mail, but how to manage it. To emphasize direct job application of electronic mail, examples used in training should come from experiences and lessons learned in the headquarters. Further study needs to be conducted to develop the best method to present this topic to the information worker.

APPENDIX A

**Organizational Chart of
Headquarters, United States Army Health Services Command**

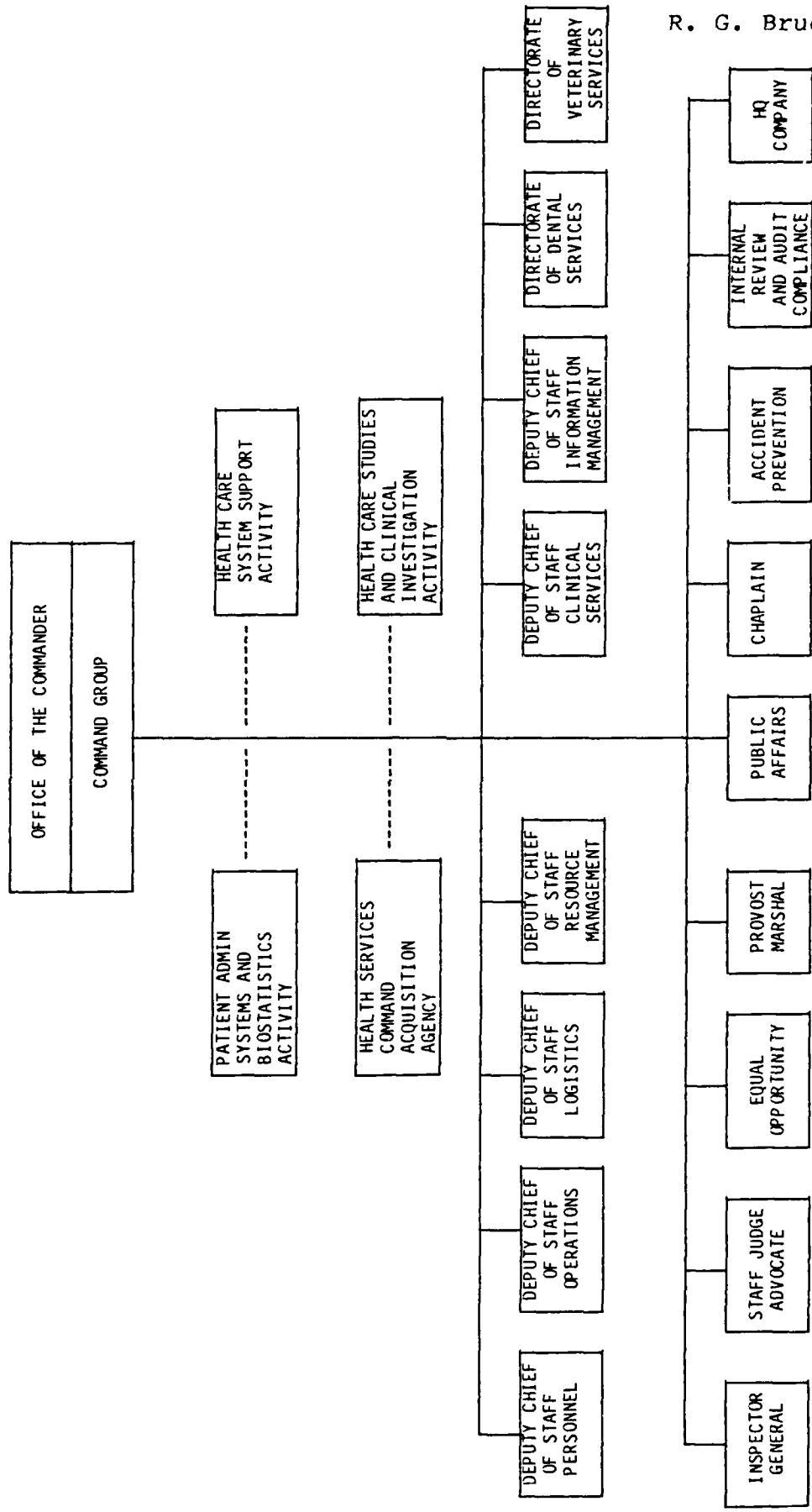


Figure 1. Organizational Chart of Headquarters, United States Army Health Services Command

APPENDIX B

Survey Instrument

Electronic Mail Survey

This survey is part of a study to determine the business value of electronic mail. The study evaluates the impact of electronic mail on the compression of time, overcoming the restrictions of geography, and possible re-structuring of command relationships. MAJ Ray G. Brueland is conducting this study as partial requirements for a Masters Degree in Health Administration from the U.S. Army - Baylor Program.

For the purpose of this study, electronic mail is defined as a form of office automation which transmits data or information, usually in textual format, by electronic means from one work area to another work area. It is generally considered to be a one-way form of communication. Electronic mail is associated with computers, but can be utilized within various word processing networks (the NBI and Wang networks are examples).

You are asked to participate in this survey by completing the attached survey. Please answer all the questions. Partially completed surveys are of no value. The survey is not a test. The survey has been carefully designed to measure your perception of the business value of electronic mail. The survey is anonymous. Please do not put your name anywhere on the survey.

Comments concerning electronic mail are encouraged and may be written in the space at the end of the survey. It is important that you respond candidly and not omit applicable answers to ensure accuracy of the analysis. Thank you for your cooperation.

1. What is your employment Category?

Officer: 01-03	Enlisted: E1-E4	Civilian: GS01-GS04
04-06	E5-E9	GS05-GS08
07-Above		GS09-GS12
Warrant Officer		GS/GM13-Above

2. Do you currently supervise more than two people?

Yes	_____
No	_____

3. What is your sex?

Male	_____
Female	_____

4. What is your age?

19 yrs or less	_____
20 yrs - 29 yrs	_____
30 yrs - 39 yrs	_____
40 yrs - 49 yrs	_____
50 yrs - 59 yrs	_____
60 yrs - Over	_____

5. Is Your immediate (First Line) Supervisor?

Officer: 01-04	Warrant Officer	Civilian: GS05-GS08
05		GS09-GS12
06	Enlisted: E5-E9	GS/GM13-Above
07-Above		_____

6. Do most of your duties involve (PLEASE, CHOOSE ONLY ONE RESPONSE):

- a. Clerical work?
- b. Being a subject matter expert (recommending various courses of action)?
- c. Deciding on policies and guidelines for work accomplishment (deciding which courses of action to accept)?

7. How long have you been with HQ, HSC?

5 months or less	<input type="checkbox"/>	4 - 6 years	<input type="checkbox"/>
6 months to 11 months	<input type="checkbox"/>	7 - 9 years	<input type="checkbox"/>
1 - 3 years	<input type="checkbox"/>	10 years or more	<input type="checkbox"/>

8. Do you personally use electronic mail at work?

Yes
No

9. Normally, do you have access to electronic mail (PLEASE, ANSWER ALL THREE PARTS OF THIS QUESTION):

a. From your work area?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b. From some other location?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c. Through some other person?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

The second group of questions pertains specifically to personal computers, such as the IBM Personal Computer, Radio Shack TRS-80, Zenith 248, etc. The questions probe your attitudes about your own use of a personal computer as an aid in your various management tasks. In answering, please assume that the personal computer is in your work area. Work quickly. Please use the scale below and circle the one letter which best describes your feelings about or reaction to each statement.

Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
SA	A	U	D	SD

10. A personal computer system would give me more timely access to needed information. SA A U D SD

11. I would not use a personal computer because this would be clerical in nature. SA A U D SD

12. Using a personal computer would involve too much time doing mechanical operations (programming, inputting data, etc.) to allow sufficient time for analysis. SA A U D SD

13. I wouldn't encourage my company to acquire personal computers because of the high purchase cost of the machine and its software. SA A U D SD

14. In the space provided below, please indicate what you think are the biggest obstacles in using a personal computer in your work area?

The third group of questions pertains specifically to communicating by electronic mail. Remember, electronic mail is defined as a form of office automation which transmits data or information, usually in textual format, by electronic means from one work area to another work area. In answering, please assume that the electronic mail capability is in your work area. Work quickly. Please use the scale below and circle the one letter which best describes your feelings about or reaction to each statement.

Strongly Agree SA	Agree A	Unsure U	Disagree D	Strongly Disagree SD
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15. Electronic mail provides me better access to multiple sources of information. SA A U D SD

16. I would not want desk top access to electronic mail because I would not be able to delegate the routine data look-up tasks which I now delegate. SA A U D SD

17. Using electronic mail, I can gather more information upon which to base my decisions. SA A U D SD

18. I will not use electronic mail because it takes too much time to learn to use. SA A U D SD

19. Using electronic mail, I have the capability of providing information directly to organizational elements several levels above and/or below my normal chain of command. SA A U D SD

20. Outside activities will not answer coordination efforts in a timely manner using electronic mail. SA A U D SD

21. The cost of electronic mail is justified by the efficiencies in information handling it creates. SA A U D SD

22. If I personally used electronic mail at work, it would damage the managerial image which I want to project. SA A U D SD

23. One benefit of using electronic mail has been the reduction in travel requirements for my office personnel. SA A U D SD

24. A problem with using electronic mail at work is the lack of control in disseminating information. SA A U D SD

25. Using electronic mail will reduce the total cost of doing business. SA A U D SD

26. Electronic mail increases the number of resources I can contact to develop alternatives in my problem solving. SA A U D SD

27. The free flow of information created by electronic mail undermines the authority of the chain of command. SA A U D SD

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Strongly Agree Agree Unsure Disagree Strongly Disagree

28. Sending a message by electronic mail requires the same amount of effort regardless of where the recipients are physically located. SA A U D SD

29. Electronic mail is primarily just a toy so it is SA A U D SD
not of much value in my problem solving.

30. Electronic mail reduces the time necessary for me to collect and evaluate alternatives in my problem solving. SA A U D SD

31. Using electronic mail, I am able to coordinate with SA A U D SD outside activities in a more timely fashion.

32. I would not personally use electronic mail because SA A U D SD
inputting data takes too much time.

33. I hesitate to use electronic mail at work because of the difficulty in using the prescribed system. SA A U D SD

34. Electronic mail decreases problems often associated with being geographically separated. SA A U D SD

35. Having direct access to all levels of management through electronic mail has changed who I contact in my problem solving. SA A U D SD

36. In the space provided below, please indicate what you think are the biggest obstacles to the productive use of electronic mail in your work area?

The fourth group of questions are multiple choice and pertain to your knowledge about computers and electronic mail. Please circle the one letter which you believe to be the best answer to each question, or circle "d" if you do not know the answer. Work quickly. Please do not guess.

37. CPU stands for:

Central Processing Unit c

Do Not Know d

38. The movement of messages by electronic mail requires:
 Both the source and destination being connected to the network
 at the same time a
 The source and destination to have access to a phone line or be
 part of a network. b
 Mailing diskettes through the mail. c
 Do Not Know d

39. Examples of electronic mail are:
 DIALCOM, NBI's E-MAIL, OPTIMIS. a
 ALDA, COMPU-SERVE, DIFT b
 SIMPLEX, PARALLEL, SERIAL c
 Do Not Know d

40. Information is actually internally stored and manipulated by a
 computer in _____ form.
 Decimal a
 Character b
 Binary. c
 Do Not Know d

41. An example of computer software is:
 A computer printer. a
 A computer program. b
 A computer operator c
 Do Not Know d

42. In utilizing electronic mail a password is used to:
 Indicate who sent the message a
 Provide a level of security to the message. b
 Address the message c
 Do Not Know d

The final group of questions are multiple choice and pertain to your use of personal computers and electronic mail. Please circle the one letter which provides the best estimate of your use of personal computers and electronic mail.

43. How long have you been using a personal computer at work?
 I do not use a personal computer at work. a
 11 months or less b
 1 to 2 years. c
 3 to 4 years. d
 5 years or more e

44. How long have you been using electronic mail at work?
 I do not use electronic mail at work. a
 11 months or less b
 1 to 2 years. c
 3 to 4 years. d
 5 years or more e

45. On the average, how often do you use a personal computer at work?

I do not use a personal computer at work. a
Only occassionally during the year. b
At least once a month c
At least once a week. d
At least once every business day. e

46. On the average, how often do you use electronic mail at work?

I do not use electronic mail at work. a
Only occassionally during the year. b
At least once a month c
At least once a week. d
At least once every business day. e

47. In the space provided below, please indicate any other comments you may have concerning electronic mail.

THANK YOU FOR YOUR TIME.

APPENDIX C

**Demographics of
Respondents to Survey**

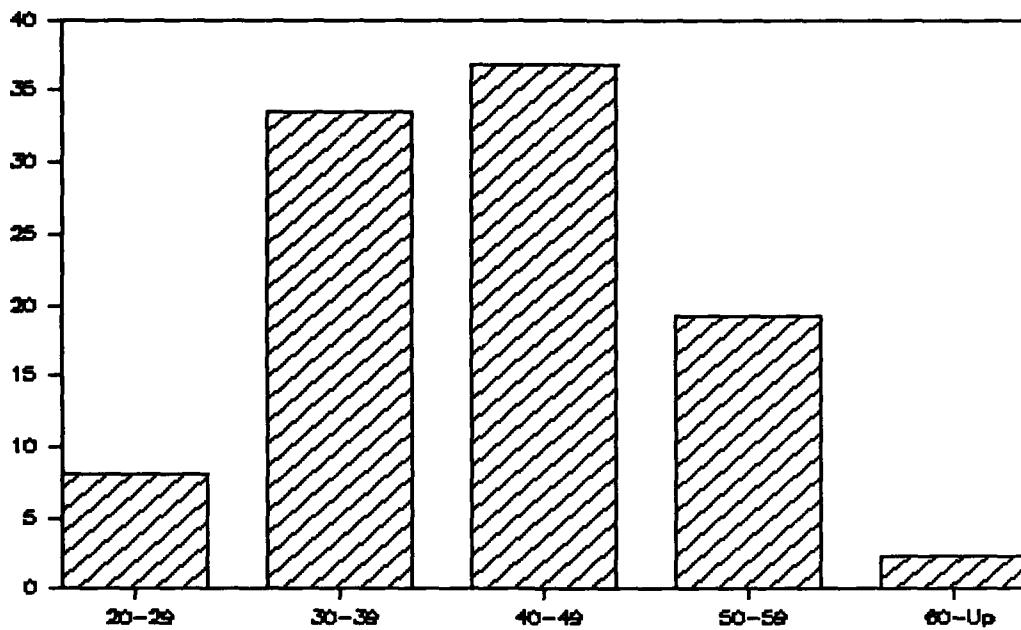


Figure 2. Age of Respondents in the Sample

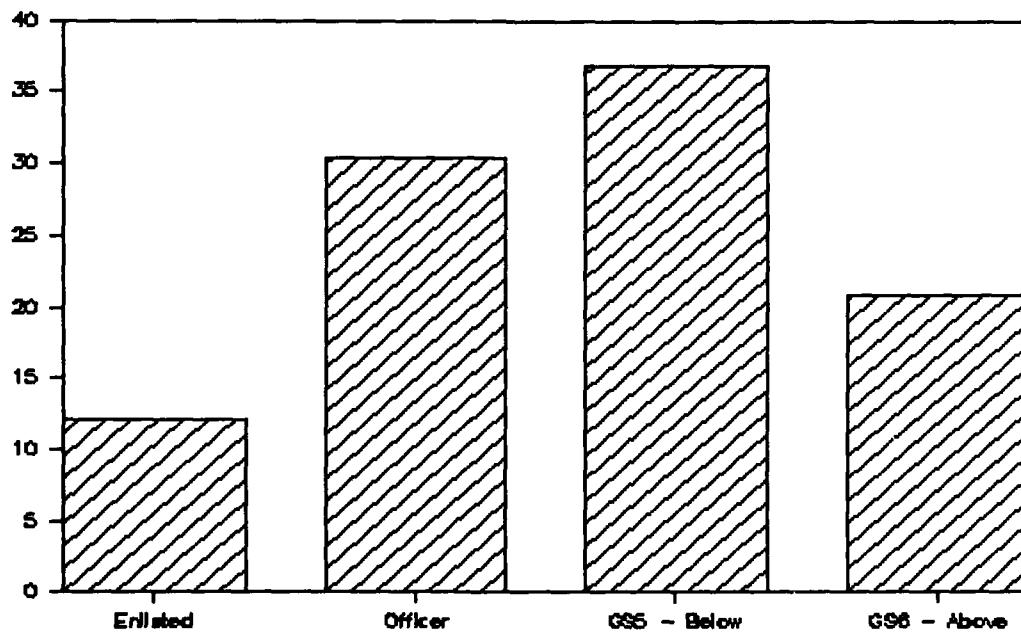


Figure 3. Employment Category of Respondents in the Sample

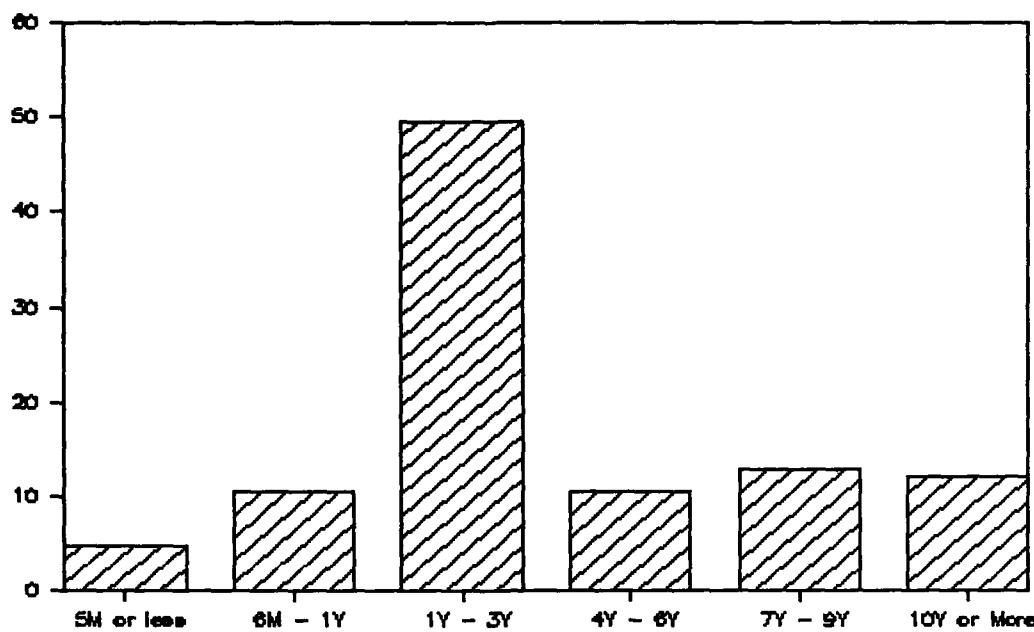


Figure 4. Tenure of Respondents in the Sample

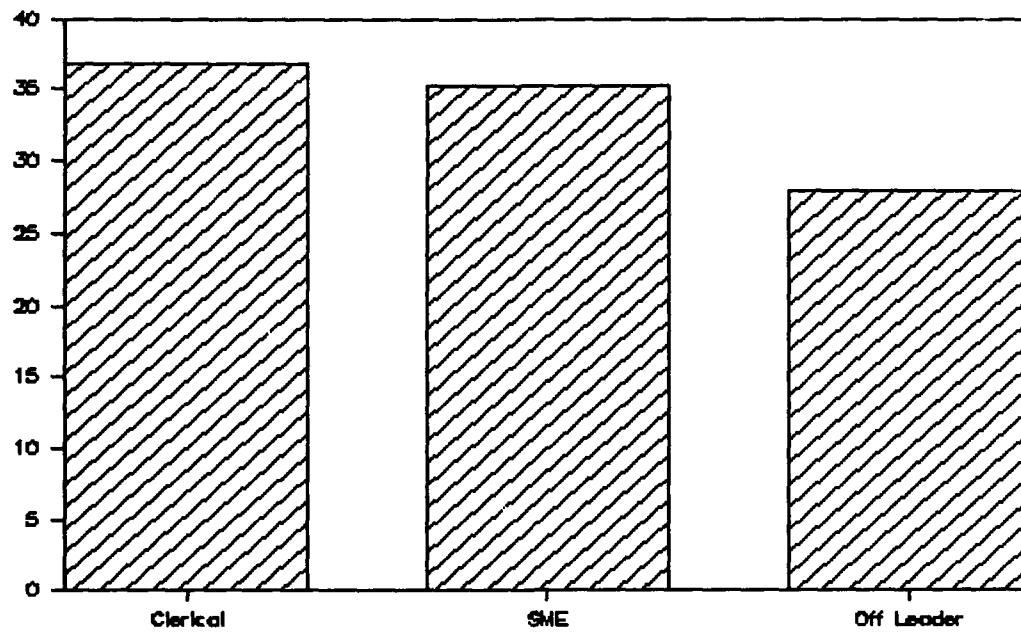


Figure 5. Duty Categories of Respondents in the Sample

APPENDIX D

**Personal Computer
Statement Analysis**

Table 16**Statement Means for the Value of Personal Computers**

Statement	Mean	Standard Deviations	Mode
10	4.368	.7884	5
11	4.472	.7359	5
12	4.048	.8786	4
13	4.400	.7725	5
Sum of Statements	17.288	2.3238	20

Source: Research Survey.

Table 17**Composite Means for the Value of Personal Computers**

Category	Users (n)	Non-Users (n)	Total (n)
Male	18.297 (37)	16.485 (33)	17.443 (70)
Female	17.458 (24)	16.807 (31)	17.091 (55)
Supervisor	17.880 (25)	17.167 (18)	17.581 (43)
Non-Supervisor	18.028 (36)	16.435 (46)	17.134 (82)
Clerical Duties	17.353 (17)	16.586 (29)	16.870 (46)
Subject Matter Experts	18.227 (22)	16.909 (22)	17.586 (44)
Office Leader Duties	18.182 (22)	16.308 (13)	17.486 (35)

Source: Research Survey.

APPENDIX E

**Electronic Mail
Statement Analysis**

Table 18**Statement Means for the Increased Speed of Coordination**

Statement	Mean	Standard Deviations	Mode
20	3.544	.8862	3
30	3.576	.8732	4
31	3.848	.8619	4
Sum of Statements	10.968	1.9383	10, 11

Source: Research Survey.

Table 19**Composite Means for the Increased Speed of Coordination**

Category	Users (n)	Non-Users (n)	Total (n)
Male	11.676 (37)	10.364 (33)	11.057 (70)
Female	11.208 (24)	10.581 (31)	10.855 (55)
Supervisor	11.840 (25)	10.278 (18)	11.186 (43)
Non-Supervisor	11.250 (36)	10.544 (46)	10.854 (82)
Clerical Duties	11.235 (17)	10.207 (29)	10.587 (46)
Subject Matter Experts	11.091 (22)	10.818 (22)	10.955 (44)
Office Leader Duties	12.091 (22)	10.462 (13)	11.486 (35)

Source: Research Survey.

Table 20**Statement Means for the Reduction in Travel**

Statement	Mean	Standard Deviations	Mode
23	3.032	.9152	3
28	3.328	1.1055	4
34	3.896	.7811	4
Sum of Statements	10.256	1.6796	10

Source: Research Survey.

Table 21**Composite Means for the Reduction in Travel**

Category	Users (n)	Non-Users (n)	Total (n)
Male	10.578 (37)	9.909 (33)	10.257 (70)
Female	10.458 (24)	10.097 (31)	10.255 (55)
Supervisor	9.800 (25)	9.778 (18)	9.791 (43)
Non-Supervisor	11.028 (36)	10.087 (46)	10.500 (82)
Clerical Duties	11.235 (17)	9.897 (29)	10.391 (46)
Subject Matter Experts	10.545 (22)	10.455 (22)	10.500 (44)
Office Leader Duties	9.955 (22)	9.462 (13)	9.771 (35)

Source: Research Survey.

Table 22**Statement Means for the Increased Access to Information**

Statement	Mean	Standard Deviations	Mode
19	4.032	.8224	4
24	3.560	.9105	4
27	3.880	.8576	4
Sum of Statements	11.472	2.0736	12

Source: Research Survey.

Table 23**Composite Means for the Increased Access to Information**

Category	Users (n)	Non-Users (n)	Total (n)
Male	12.784 (37)	11.061 (33)	11.971 (70)
Female	11.208 (24)	10.548 (31)	10.971 (55)
Supervisor	12.640 (25)	11.500 (18)	12.163 (43)
Non-Supervisor	11.833 (36)	10.544 (46)	11.110 (82)
Clerical Duties	11.529 (17)	10.310 (29)	10.761 (46)
Subject Matter Experts	12.318 (22)	11.045 (22)	11.682 (44)
Office Leader Duties	12.500 (22)	11.538 (13)	12.143 (35)

Source: Research Survey.

Table 24**Statement Means for Cost Savings**

Statement	Mean	Standard Deviations	Mode
21	3.808	.8862	4
25	3.424	.8449	3
29	4.144	.8491	4
Sum of Statements	11.376	2.1276	12

Source: Research Survey.

Table 25**Composite Means for Cost Savings**

Category	Users (n)	Non-Users (n)	Total (n)
Male	12.460 (37)	11.061 (33)	11.800 (70)
Female	11.417 (24)	10.387 (31)	10.836 (55)
Supervisor	12.360 (25)	11.333 (18)	11.930 (43)
Non-Supervisor	11.833 (36)	10.500 (46)	11.085 (82)
Clerical Duties	11.471 (17)	10.552 (29)	10.891 (46)
Subject Matter Experts	11.955 (22)	10.955 (22)	11.455 (44)
Office Leader Duties	12.591 (22)	10.769 (13)	11.914 (35)

Source: Research Survey.

Table 26**Statement Means for the Increased Number of Sources Contacted**

Statement	Mean	Standard Deviations	Mode
15	4.032	.8701	4
17	3.776	.8968	4
26	3.936	.7905	4
Sum of Statements	11.744	2.1586	12

Source: Research Survey.

Table 27**Composite Means for the Increased Number of Sources Contacted**

Category	Users (n)	Non-Users (n)	Total (n)
Male	12.757 (37)	11.394 (33)	12.114 (70)
Female	11.833 (24)	10.839 (31)	11.273 (55)
Supervisor	12.760 (25)	11.889 (18)	12.395 (43)
Non-Supervisor	12.139 (36)	10.926 (46)	11.402 (82)
Clerical Duties	11.824 (17)	10.586 (29)	11.043 (46)
Subject Matter Experts	12.182 (22)	11.818 (22)	12.000 (44)
Office Leader Duties	13.045 (22)	11.154 (13)	12.343 (35)

Source: Research Survey.

Table 28**Statement Means for the Change in Organizational Roles**

Statement	Mean	Standard Deviations	Mode
16	3.872	.8422	4
22	4.176	.8237	4
35	3.088	.8891	3
Sum of Statements	11.136	1.8110	11

Source: Research Survey.

Table 29**Composite Means for the Change in Organizational Roles**

Category	Users (n)	Non-Users (n)	Total (n)
Male	12.054 (37)	10.849 (33)	11.486 (70)
Female	11.167 (24)	10.323 (31)	10.691 (55)
Supervisor	12.000 (25)	11.278 (18)	11.698 (43)
Non-Supervisor	11.500 (36)	10.326 (46)	10.842 (82)
Clerical Duties	11.353 (17)	10.552 (29)	10.848 (46)
Subject Matter Experts	11.636 (22)	10.545 (22)	11.091 (44)
Office Leader Duties	12.045 (22)	10.769 (13)	11.571 (35)

Source: Research Survey.

Table 30**Statement Means for the Reduction in Anxiety**

Statement	Mean	Standard Deviations	Mode
18	4.160	.8072	4
32	4.024	.8657	4
33	3.864	.9188	4
Sum of Statements	12.048	2.2138	12

Source: Research Survey.

Table 31**Composite Means for the Reduction in Anxiety**

Category	Users (n)	Non-Users (n)	Total (n)
Male	13.351 (37)	11.303 (33)	12.386 (70)
Female	12.500 (24)	10.936 (31)	11.618 (55)
Supervisor	13.360 (25)	11.500 (18)	12.581 (43)
Non-Supervisor	12.778 (36)	10.978 (46)	11.768 (82)
Clerical Duties	12.471 (17)	10.793 (29)	11.413 (46)
Subject Matter Experts	12.682 (22)	11.545 (22)	12.114 (44)
Office Leader Duties	13.773 (22)	11.154 (13)	12.800 (35)

Source: Research Survey.

APPENDIX F

**One to One
Correlations**

Table 32**One to One Correlations, for "Use" to**

Data Element	Correlation Coefficient
Clerical Duties	-.18080*
Subject Matter Expert Duties	.01769
Officer Leader Duties	.17537
Supervisor	.13530
Gender	.09157
Increased Speed of Coordination	.26489*
Reduction in Travel	.15675
Increased Access to Information	.32709*
Cost Savings	.31014*
Increased Number of Sources Contacted	.29490*
Change in Organizational Roles	.30793*
Reduction in Anxiety	.42878*

*Significant at the 0.05 level.

Source: Research Survey.

Table 33

One to One Correlations, for "Clerical Duties" to

Data Element	Correlation Coefficient
Increased Speed of Coordination	-.15061
Reduction in Travel	.06172
Increased Access to Information	-.26275*
Cost Savings	-.17453
Increased Number of Sources Contacted	-.24863*
Change in Organizational Roles	-.12191
Reduction in Anxiety	-.21974*

*Significant at the 0.05 level.

Table 34

One to One Correlations, for "Subject Matter Experts Duties" to

Data Element	Correlation Coefficient
Increased Speed of Coordination	-.00514
Reduction in Travel	.10750
Increased Access to Information	.07488
Cost Savings	.02732
Increased Number of Sources Contacted	.08776
Change in Organizational Roles	-.01842
Reduction in Anxiety	.02194

*Significant at the 0.05 level.

Table 35

One to One Correlations, for "Office Leaders" to

Data Element	Correlation Coefficient
Increased Speed of Coordination	.16723
Reduction in Travel	-.18064*
Increased Access to Information	.20257*
Cost Savings	.15841
Increased Number of Sources Contacted	.17370
Change in Organizational Roles	.15054
Reduction in Anxiety	.21268*

*Significant at the 0.05 level.

Table 36

One to One Correlations, for "Supervisor" to

Data Element	Correlation Coefficient
Increased Speed of Coordination	.08179
Reduction in Travel	-.20142*
Increased Access to Information	.24222*
Cost Savings	.18939*
Increased Number of Sources Contacted	.21938*
Change in Organizational Roles	.22549*
Reduction in Anxiety	.17518

*Significant at the 0.05 level.

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